

STRATEGIES FOR PAIRWISE ASSESSMENT OF “MORE LIKELY” RANGES

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BASIC CONSIDERATIONS

In making pairwise comparisons, various shortcuts could be employed. First, three broad categories of probabilities could be highlighted:

- Very unlikely events at say around 1% - 5% probability.
- Moderately likely events at say 15% - 30% probability.
- Very likely events at say 40% - 60% probability.

Corresponding “more likely” ranges here would be respectively: Base, 15%/5% or say 3 - 4, and 60%/25% or say 2 - 3 times “more likely”. Qualitative assessments may be another approach with slightly (1 – 1.25), moderately (1.25 – 1.75) and significantly (1.75 – 2) “more likely” ranges resulting. Or expressed as percentage gains, up to 25%, 75% and twice as likely respectively. Using a five-event problem as an example, let the events in order of likelihood be A (lowest probability), B, C, D and E (highest probability). Calculated probabilities are outlined in the following table.

CALCULATION OF PROBABILITIES

Scenarios		Pairwise Range		Probabilities				More Likely Values	
Events	Ratios	Low	High	P(Low)	P(High)	Average	%	Average	%
A	Base ⇒ 1	1.00	1.00	0.084	0.036	0.060	6	Base	Base
B	B/A	2.00	3.00	0.168	0.109	0.139	14	2.32	2.33
C	C/B	1.00	1.25	0.168	0.137	0.153	15	1.10	1.07
D	D/C	1.25	1.75	0.211	0.239	0.225	23	1.47	1.53
E	E/D	1.75	2.00	0.368	0.478	0.423	42	1.88	1.83
				0.999	0.999	1.000	100		

The compound likelihood for event E for the Low case would be $1*2*1*1.25*1.75$ or 4.375 with total compound likelihood for Low over all events of 11.875. This results in a probability for event E or P(E) at $4.375/11.875$ or 0.368. The probability for event E based on the above assessments ranges from 37% to 48% for an average of 42%.

BENCHMARKS

In assessing pairwise ranges, benchmark values can be useful. For example, is the slightly more likely event in the assessment definitely more than equally likely than its predecessor event in the ranking as in 1 – 1.25? If so, then 1.1 or 1.2 may be a better lower bound than 1.0. That is, at least 10% or 20% “more likely”. Similarly, for a significantly more likely event can we rule out 2 and use say 1.9? Or possibly, slightly greater than 2 using 2.25 as the upper bound? In summary, routine use of integer ranges as in 1 – 2, 2 – 3 etc may be easy and correct but could possibly be fine-tuned using more analysis resulting in more accurate probabilities.

HYPOTHETICAL PROBABILITIES

Using hypothetical probabilities can also “tease” out “more likely” values. For example, consider two events as in C and B and ask the question if P(C) were say a 50% chance, what would be the corresponding “less likely” probability for P(B)? The 50% is, of course, just a number for reference. If the answer was say 30% then this means the “more likely” value is 1.67 with resulting pairwise ranges of say 1.5 – 2 or 1.6 – 1.8 if a narrower range is justified. That is, relative ranges may be easier to formulate with a fixed (even though hypothetical) probability for one of the two events.

CONCLUSIONS

Two broad strategies can be employed:

- Direct event-by-event comparisons with encompassing range as in 60%/15% above or say 3.5 – 4.5.
- Range comparisons by likelihood gain with a first range of 3 - 4, less gain 2 - 3 and more gain 4 – 5 etc.